

GUIDANCE MANUAL
Methyl Bromide (With Chloropicrin)
Field Soil Fumigation

WORKSITE PLAN

The operator of the property to be treated is responsible for completing and submitting a proposed Worksite Plan to the commissioner. The Worksite Plan contains the detailed specific information about the local conditions at the intended fumigation site. **This detailed information will be used to determine the appropriate mitigation measures (conditions) to be utilized at the specific fumigation site before a restricted material permit is issued for the proposed use. The county agricultural commissioner will evaluate the Worksite Plan and local conditions, then condition and issue the use permit.**

DPR does not prescribe a particular form for the Worksite Plan. Commissioners should custom-tailor their own Worksite Plan forms in a manner that addresses local issues and in a format that works best for their county.

However, it should contain as much detailed information as necessary to determine the appropriate mitigation measures (conditions) to place on the applicant's restricted materials permit.

The Worksite Plan should contain the following information:

- **Property Operator (to be treated)**
 - Name, Business Address, Business Telephone Number
 - Contact Person
 - Fumigation Site Location

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- **Pest Control Business**
 - Name, Business Address, Business Telephone Number
 - Contact Person
- **Methyl Bromide Product (Singly, or in combination with Chloropicrin)**
 - Brand Name, Registration Number, Registrant
 - Application Rate
 - Number of Acres
 - Fumigation Method
 - Type of Tarpaulin
 - Earliest Date of Fumigation
 - Latest Date of Fumigation
 - Posting of Inner Buffer Zone Perimeter On Other Properties
 - Description of Activities Within Buffer Zones
 - Anticipated Expiration Date and Time of Buffer Zones
 - Detailed Map Showing Field Location, Field Dimensions, On-Site and Off-Site Housing, Other Sensitive Areas
- **Notification To Neighboring Property Operators**
 - Method of Notification
 - Copy of Written Notification (if applicable)
 - Date(s) of Notification
 - Map(s) Showing Neighboring Properties Notified
- **Tarpaulin Repair and Response Plans**
 - Person(s) Responsible
 - Person(s) Certified To Test Ambient Air Concentrations of Methyl Bromide
 - Schedule For Checking Tarpaulins
 - Minimum Time Following Injection That Tarpaulin Will Be Repaired
 - Minimum Size of Damage That Will Be Repaired
 - Other Factors Used To Determine When Tarpaulin Repair Will Be Conducted
 - Type of Testing Device Used To Measure Air Concentrations
 - Type and Number of Respiratory Protection Devices Available At Site
- **Tarpaulin Removal Plan**
 - Person(s) Responsible
 - Equipment Used To Cut Tarpaulins
 - Method Used To Cut Tarpaulins
 - Schedule For Cutting Tarpaulins
 - Schedule For Removing Tarpaulins

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NOTIFICATION REQUIREMENTS

Figure 2. Summary of Notification Requirements provides a complete overview of the requirements for providing notification information to the commissioner and to neighboring property operators about an intended fumigation.

Notification to the Commissioner:

The operator of the property to be treated is required by section 6450.1(a) to provide notification (Notice of Intent - NOI) to the county agricultural commissioner **at least 48 hours** prior to commencing fumigation. The NOI must include the following information:

- 1) **Hour** the fumigation is intended to commence,
- 2) **Notice of Intent** Information specified in section 6434(b);
 - a) permit number
 - b) name and address of permittee and applicator
 - c) location of areas to be treated and name of farm (property) operator
 - d) site to be treated
 - e) acres to be treated
 - f) fumigation method
 - g) pesticide(s)
 - h) volume per acre, and dosage
 - i) pests to be controlled
 - j) date intended fumigation is to commence
 - k) location and identity of areas which may be impacted.

The commissioner should confirm that the information on the NOI is consistent with the Worksite Plan.

For multiple application blocks to be fumigated sequentially, the commissioner may allow one NOI that includes a fumigation schedule for all the application blocks in lieu of a separate NOI for each application block to be fumigated.

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Notification to Neighboring Property Operators:

The purpose of the **(initial) notification** is to provide an opportunity to persons who reside on certain properties (see below) to receive information that a permit has been issued by the commissioner.

Regulations section 6450.1(b) require the operator of the property to be treated to assure that the **operator of the property** for the following types of properties that are within 300 feet of the outer buffer zone receive the initial notification information:

- 1) Schools
- 2) Residences
- 3) Hospitals
- 4) Convalescent homes
- 5) Onsite employee housing
- 6) Similar sites identified by the commissioner

Note: "Operator of the Property" includes any person "...who owns the property and/or is legally entitled to possess or use the property through terms of a lease, rental contract, trust, or other management arrangement."

Examples include: a principal of a school; a tenant of an apartment complex; a tenant of a single-family dwelling; the administrator of a convalescent home.

The **initial notification** must be in writing, or by other means approved by the commissioner and must be delivered at least 7 days prior to the submission the NOI. The notification must include:

- 1) Name of the pesticide(s)
- 2) Name, business address, and business telephone number of the operator of the property to be treated
- 3) Name, business address, and business telephone number of the commissioner
- 4) Earliest and latest dates that the fumigation will start
- 5) How to request subsequent notification of the specific date and time of the fumigation

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Note: Information on methyl bromide is available on the Internet. A list of Web Site addresses where information on methyl bromide can be found is included in the appendix at end of this manual.

For persons who received the initial notification and who request **subsequent notification**, the operator of the property to be treated must assure that those persons receive specific notification of the date and time of the start of the fumigation and anticipated expiration of the buffer zones. This notification must be provided at least 48 hours prior to the start of the fumigation.

Note:

- 1) If a request for subsequent notification is received AFTER submission of the NOI and BEFORE the fumigation begins, the 48-hour requirement does not apply, but the specific notice must be provided prior to starting the fumigation.
- 2) If fumigation of the application block doesn't commence within the time frame specified on the Notice of Intent (no sooner than the intended starting time or later than 12 hours after the intended starting time specified on the NOI) then a new notification must be provided to those persons who requested the subsequent notice, but the 48-hour requirement does not apply.

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Buffer Zone Background Information

The risk characterization by DPR for methyl bromide indicates acute exposure to 210 parts per billion (ppb), [24-hour time-weighted average] provides a 100-fold margin of exposure (100 times less than the no observed effect level in animal tests). The regulatory requirements for methyl bromide are designed to limit peoples' exposure to less than 210 ppb, as a 24-hour average.

Methyl bromide concentrations decrease as the distance from the fumigated field increases. DPR uses monitoring data and a computer model to determine the distance at which 210 ppb occurs, and specifies this distance as the buffer zone size. The size is calculated using specific estimates and assumptions about the methyl bromide emission rate and weather. The buffer zone size is a fixed distance for any given application rate, number of acres, and application method. The fixed buffer zone sizes are used to set a standard for enforcement. The fixed buffer zone sizes do not imply a fixed or constant air concentration; air concentrations at the buffer zone distance are variable. The buffer zone distance cannot be used as a surrogate for estimating air concentrations. For example, if the buffer zone distance is 200 feet, this does not mean that the air concentration is always 210 ppb at 200 feet. In fact, air concentrations should be less than 210 ppb almost all of the time at the buffer zone distance. Similarly, if someone is 190 feet away from the application, does not mean that he/she will be exposed to a harmful amount of methyl bromide.

The buffer zone is not an exclusion zone meant to prohibit entry throughout the buffer zone duration. People may spend short periods of time inside the buffer zone and not exceed an exposure of 210 ppb, as a 24-hour average. Since 210 ppb is a time-weighted average, the equivalent concentration increases linearly as the duration of exposure decreases. For example, 210 ppb for 24 hours is equivalent to 420 ppb for 12 hours, or 5000 ppb for 1 hour.

The data show that 210 ppb is not exceeded even with no buffer zone in some cases, using both empirical data and computer modeling. While the data may support no buffer in some cases, a minimum buffer should be required because of variability in emission rate over a field and other factors not accounted for by the computer model.

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BUFFER ZONE DETERMINATION.

Two buffer zones are specified in section 6450.2, an **Inner Buffer Zone** and an **Outer Buffer Zone**. (Ref: *Figure 7. Diagram of Inner and Outer Buffer Zones*). The sizes of the buffer zones are dependent upon the size of the application block to be fumigated, the application rate (pounds actual methyl bromide per acre), and the application method to be used. This section describes the procedures necessary for determining, measuring, and managing the appropriate buffer zone distances required at the fumigation site.

Buffer Zone Determination: Summary

The following steps are used to determine the buffer zone requirements associated with an application block (*Figure 3. Summary of Buffer Zone Determination*).

1. Determine if the proposed application block is **Isolated** or **Non-Isolated** from other application blocks (*Figure 4. Isolated Application Block Determination*).
2. Verify that the **Fumigation Method** conforms to a method described in *Table 1. Field Soil Fumigation Methods and Emission Ratios*.
If it does not, then the fumigation may not proceed.
3. Determine the **emission rate** and **acreage**. The emission rate is based on the application rate and fumigation method (emission ratio). The acreage is based on the total acreage of all non-isolated application blocks (*Figure 5. Emission Rate and Acreage Determination and Table 1*).
4. Determine the appropriate **buffer zone distances** from *Table 4, Inner Buffer Zone and Table 2, Outer Buffer Zone* for the specific fumigation method to be used.
5. Determine the **buffer zone duration** based on the application rate, acreage, and fumigation method (*Tables 5A, 5B, 5C. Buffer Zone Duration*).

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Buffer Zone Determinations: Isolated Application Blocks

Application blocks that are fumigated near each other in time and distance will increase the overall air concentrations and require larger buffer zones. The following steps are used to determine if other methyl bromide application blocks will affect the application block under evaluation (*Figure 4*).

An application block is **isolated** if:

1. The distance between application blocks is **more than 1,300 feet**
OR,
2. **36 hours will elapse** between the end of injection of one application block and the start of injection of the other application block.

Example: Application blocks 1 and 2 are separated by 200 feet. Injection for application block 1 starts on June 1, 8:00 AM and ends at 4:00 PM. The block is isolated if the injection for application block 2 does not begin before June 3, 4:00 AM.

The following steps are used to determine the buffer zones for isolated application blocks:

1. Determine the acreage and application rate for the application block. **The application rate for bed or strip fumigations may need to be adjusted to an equivalent broadcast application rate. A broadcast application is one where the application of a pesticide occurs uniformly over the area to be treated without regard to arrangement of crops as in rows. If a bedded or strip application is planned and the recommended application rate on the product label is for the beds only (on some labels listed as “treated area”), an adjustment of the application rate to a broadcast basis should be made. For example, a 20-acre field contains beds that are 30 inches wide and furrows that are 30 inches wide. The furrows make up half the area of the field and the treated bed area is 10 acres. The application rate stated on the label is 400 pounds per acre to the 10-acre treated bed area. The application rate for determining the buffer zone size should be 200 pounds per acre, over 20 acres.**
2. Find the **Emission Ratio** for the chosen fumigation method in *Table 1*.

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3. Determine the **Emission Rate** by multiplying the application rate in pounds per acre by the **Emission Ratio**.
4. Determine the appropriate buffer zone distance from *Table 4, Inner Buffer Zone* and *Table 2, Outer Buffer Zone* for the particular application method to be used by selecting the appropriate acreage in the left-hand column. Next, select the appropriate emission rate from the top row. The buffer zone distance (in feet) is the numerical value where the acreage row and application rate column intersect.

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a. Inner Buffer Zone Example:

The application block is 20 acres. Methyl bromide is applied at a rate of 400 pounds per acre. The Fumigation Method is Tarpaulin/Deep/Broadcast: (*Table 1*). Find the appropriate inner buffer zone distance from *Table 4* for Tarpaulin/Deep/Broadcast.

Emission Rate = Emission Ratio X Application Rate

Emission Rate = $0.40 \times 400 \text{ \# / Acre} = 160$

Inner Buffer Zone Distance = 600 feet (*Table 4*)

b. Outer Buffer Zone Example:

The application block is 20 acres. Methyl bromide is applied at a rate of 400 pounds per acre. The Fumigation Method is Tarpaulin/Deep/Broadcast (*Table 1*). Find the appropriate buffer zone distance from *Table 2* for Tarpaulin/Deep/Broadcast.

Emission Rate = Emission Ratio X Application Rate

Emission Rate = $0.40 \times 400 \text{ \# / Acre} = 160$

Outer Buffer Zone Distance = 1600 feet (*Table 2*)

Buffer Zone Determinations: Non-Isolated Application Blocks

1. Make a list of all of the following application blocks:
 - a. The application block under evaluation.
 - b. Previously treated blocks within 1,300 feet **AND** those where 36 hours HAVE NOT elapsed between treatments.
 - c. Proposed blocks within 1,300 feet **AND** those where 36 hours WILL NOT elapse between treatments.
2. Determine the acreage, application rate, and fumigation method for each application block on the list. **The application rate may need to be adjusted for bed or strip fumigations as discussed in the application rate determination for isolated blocks.**

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Example:

Field 1 is 20 acres, 250 pounds/acre of actual methyl bromide, and the fumigation method is Tarpaulin/Shallow/Bed. It is less than 1,300 feet from Field 2 and only 24 hours have elapsed since the fumigation began in Field 1. Field 2 is 7 acres, 400 pounds of actual methyl bromide, and the fumigation method is Tarpaulin/Deep/Broadcast.

3. Determine the **Emission Ratio**, based on the fumigation method for each block on the list (*Table 1*).

Example:

The **Emission Ratio** for Field 1 is 0.80
The **Emission Ratio** for Field 2 is 0.40

4. Determine the **Emission Rate** for each block on the list by multiplying the application rate by the Emission Ratio.

Example:

The **Emission Rate** for Field 1 is $0.80 \times 250 = 200$
The **Emission Rate** for Field 2 is $0.40 \times 400 = 160$

Fields 1 and 2 have an aggregate acreage of 27 acres.

5. The blocks making up the list and the aggregate acreage may be different for each individual block because the point from which the 1,300 feet and 36 hours are measured may be different. **Each block must be evaluated individually.** Also, the buffer zone for each treated block may need to be modified if a nearby block is treated less than 36 hours later.
6. Use the **highest Emission Rate** on the list and aggregate acreage to find the buffer zone distances on *Table 2*. If the Emission Rate is not listed in *Table 2*, go to the next highest value on the table.

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7. **Inner Buffer Zone Example:** To calculate the buffer zone distance, take the **highest Emission Rate** shown in step 4, 200 pounds/acre X day.

Emission Rate = (200 pounds/acre X day)

Using *Table 4*, at 200 pounds/acre X day and 27 acres, the Inner Buffer Zone would be 1000 feet from the edges of both

8. **Outer Buffer Zone Example:** The highest **Emission Rate** is 200 pounds /acre X day and the aggregate acreage is 27 acres. Using *Table 2*, at 200 pounds /acre X day and 27 acres, the Outer Buffer Zone is 2400 feet from the edges of both fields.

Inner Buffer Zone Measurement and Duration

1. The Inner Buffer Zone is measured from the perimeter of the application block and the restrictions are in effect from the start of the fumigation, but the duration is in effect for 36 hours to 84 hours following the end of the fumigation.
2. No persons are allowed within the Inner Buffer Zone except to transit and perform fumigation handling activities.

Outer Buffer Zone Measurement and Duration

1. The Outer Buffer Zone distance is measured from the perimeter of the application block and the duration is in effect for a minimum of 36 hours to a maximum of 84 hours following the end of fumigation depending on fumigation method, application rate, and number of acres treated.
2. Persons not involved with the fumigation are only allowed to transit or to conduct activities approved by the county agricultural commissioner in the Outer Buffer Zone.

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Additional Buffer Zone Considerations

Sloped Fields

A larger buffer zone may be necessary for sloped fields, under certain weather conditions. Cold air drainage can occur during calm, clear nights. Under these conditions, cold air can move downhill due to differences in air density. This type of movement is not accounted for in the calculation of the buffer zone tables. The buffer zone size should be adjusted if these conditions are expected to occur while the buffer zone is in effect, and the application block has a slope that exceeds 5 percent (5-foot drop in elevation per 100-foot distance). The exact adjustment is difficult to determine, but DPR recommends increasing the buffer zone 2 - 3 times under these circumstances. The buffer zone only needs to be adjusted in the downhill direction.

This phenomenon is due to weather, not methyl bromide's chemical characteristics. Methyl bromide will not move downhill because "it is heavier than air." This is a misconception about the behavior of methyl bromide and other "dense" gases. A buffer adjustment is not necessary for a sloped field that will have some air movement.

Application Equipment Calibration

The buffer zone calculations assume an accurate and consistent amount of methyl bromide is injected into the field, at least within 5 - 10 percent. If an application rig is difficult to calibrate accurately or delivers a variable amount of methyl bromide, the emission ratio should be adjusted to account for these errors. For example, if an application rig can only be calibrated to within 20 percent accuracy, the emission ratio should be increased by 20 percent to account for this error.

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Buffer Zone Size Changes for Non-Isolated Blocks

The buffer zone size may change over time for non-isolated blocks. This may be useful because the time people must vacate a residence is minimized. For example, if two adjacent 5-acre blocks are fumigated on consecutive days, these blocks are non-isolated and the buffer zone is based on 10 acres. However, the buffer zone for the first block on the first day can be calculated as an isolated 5-acre block. It will not become a non-isolated block until the second day when the adjacent 5-acre block is fumigated. If the buffer zone for a 5-acre block is 500 feet and a 10-acre block is 700 feet, with a residence at 600 feet, the residence does not need to be vacated until the second block is fumigated.

Strip Fumigations

Strip fumigations are applications that have alternating fumigated and unfumigated areas, similar to bed fumigations where the beds are fumigated and the furrows are not fumigated. Strip fumigations can be used for broadcast (flat field) fumigations [methods 6450.3(a)(2), (3), and (5)]. Buffer zones for strip fumigations should be calculated the same as bed fumigations. The application rate for strip fumigations should be adjusted to an equivalent broadcast application rate. For example, a 20-acre field will be treated in alternating strips 10 feet wide. The treated strips make up half the area of the field and the treated area is 10 acres. The application rate is 400 pounds per acre to the 10-acre treated strip area. The application rate for determining the buffer zone size should be 200 pounds per acre, over 20 acres. The emission ratios for strip fumigations are the same as a normal broadcast fumigation, except for method 6450.3(a)(3)(B)(1). Method 6450.3(a)(3)(B)(1) should use an emission ratio of 0.40 for strip fumigation, and 0.25 for the normal broadcast method (Table 1).

Notwithstanding 3CCR Section 6770, commissioners should not allow entry into the treated area prior to the expiration of the REI, including the strips not fumigated, except to repair tarps as described in 3CCR Section 6784(b)(6). For tarp/broadcast fumigations [methods 6450.3(a)(3) and (5)], the REI does not expire until the tarps are removed. This precludes fumigating the area between tarped strips until the tarps have been removed.

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Inner Buffer Zone Extending into Roadways

The inner buffer zone may extend into public roads, highways, and other similar means of travel or sites, upon the approval of the county agricultural commissioner. This language is the same for the outer buffer zone. “Other similar means of travel or sites” that commissioners may approve include sites/areas where people stay only for a short period of time, as in passing through. This may include trails and paths used for travel such as bicycling, horseback riding or walking/jogging/running; and waterways such as rivers and streams used for travel. This should not include areas where people may stay for more than a few minutes, such as bus stops or road construction zones. The requirements of 6450.2 (e)(3) still apply and the only activities allowed within the inner buffer zone are transit and fumigation handling activities.

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FUMIGATION METHODS

The following fumigation methods are approved by the Department of Pesticide Regulation for field soil fumigation with methyl bromide used in combination with chloropicrin. The specific fumigation requirements for using these methods are covered in section 6450.3. "Fumigation Methods".

- | | |
|------------------------------------|------------------|
| 1. Nontarpaulin / Shallow / Bed | [6450.3(a)(1)]* |
| 2. Nontarpaulin / Deep / Broadcast | [6450.3(a)(2)]** |
| 3. Tarpaulin / Shallow / Broadcast | [6450.3(a)(3)] |
| 4. Tarpaulin / Shallow / Bed | [6450.3(a)(4)] |
| 5. Tarpaulin / Deep / Broadcast | [6450.3(a)(5)] |
| 6. Drip System (Hot Gas) | [6450.3(a)(6)] |

Each, methyl bromide field soil fumigation must conform to all requirements specific to a fumigation method listed in *Table 1. Methyl Bromide Field Soil Fumigation Methods and Emission Ratios*. An applicator may not "mix-and-match" the requirements of two or more fumigation methods. Equipment and fumigation requirements are described in section 6450.3 (a).

* Chisel injection points must be positioned beneath and ahead of the closing shoes.

** If a second tractor is used to further break up chisel marks and compact the soil to ensure maximum sealing of soil surface, it should follow within 5 minutes of the injection. If a disk is used, it should be set to a maximum depth of 2 inches.

NOTE: Other soil fumigation methods such as golf course, greenhouse, potting soil, tree-hole, and raised-tarpaulin nursery fumigation of less than one acre are not covered in this guidance document.

TABLE 1. METHYL BROMIDE FIELD SOIL FUMIGATION METHODS AND EMISSION RATIOS

Each methyl bromide fumigation must conform to all requirements specific to a Fumigation Method listed below. An applicator may not "mix-and-match" the requirements of two or more fumigation methods. Equipment and fumigation requirements are described in section 6450.3(a).

Section 6450.3(a)	Fumigation Method	Injection Type	Injection Depth (in.)	Injection Spacing (in.)	Tractor Implements	Dilution Fan	Max Rate (lbs/ac)	Emission Ratio
(1)	Nontarp/Shallow/Bed	Rearward chisel	10 - 15	40 or less	Closing shoes & bed shaper *	Yes	200	0.40
(2)(B)1	Nontarp/Deep/Broadcast	Forward chisel	20+	68 or less	None	Yes	400	0.40
(2)(B)2	Nontarp/Deep/Broadcast	Forward chisel	24+	68 or less	Closing shoes, compaction roller	No	400	0.40
(3)(B)1	Tarp/Shallow/Broadcast	Horizontal V-shaped blades	10 - 15	12 or less	None	Yes	400	0.25
(3)(B)1	Tarp/Shallow/Broadcast (STRIP FUMIGATION)	Horizontal V-shaped blades	10 - 15	12 or less	None	Yes	400	0.40
(3)(B)2	Tarp/Shallow/Broadcast	Rearward chisel	10 - 15	12 or less	Closing shoes, compaction roller	No	400	0.80
(4)(B)1	Tarp/Shallow/Bed	Rearward chisel	6 - 15	12 or less	Closing shoes, compaction roller	No	250	0.80
(4)(B)2	Tarp/Shallow/Bed	Rearward chisel	6 - 15	12 or less	Bed shaper	No	250	0.80
(4)(B)3	Tarp/Shallow/Bed	Rearward chisel	6 - 15	12 or less	Bed former and bed shaper	No	250	0.80
(5)(B)1	Tarp/Deep/Broadcast	Forward chisel	20+	66 or less	None	Yes	400	0.40
(5)(B)2	Tarp/Deep/Broadcast	Forward chisel	20+	66 or less	Closing shoes, compaction roller	No	400	0.40
(6)	Drip System-Hot Gas	Drip tubing	1+	NA	NA	NA	225	1.0

* Optionally, closing shoes and a compaction roller can be used.

TABLE 2. OUTER BUFFER ZONE DISTANCES (FEET) FOR FIELD SOIL FUMIGATION, EXCEPT METHOD SECTION 6450.3(a)(3)(B)1.

- Select the appropriate "Acreage" in the left-hand column.
- Select the appropriate "Emission Rate" from the top row.
- Read the buffer zone distance where the "Acreage" row and the "Emission Rate" columns intersect.

Acres	Emission Rate (pounds/acre-day)														
	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
1	100	100	100	100	100	100	100	100	110	110	110	120	130	140	150
2	100	100	100	100	100	100	110	120	130	150	160	170	190	210	230
3	100	100	100	100	100	100	120	140	160	180	200	230	250	270	290
4	100	100	100	100	100	110	140	160	190	220	240	270	300	330	350
5	100	100	100	100	110	120	150	180	210	250	280	310	340	370	400
6	100	100	100	100	120	140	170	210	240	270	310	340	370	410	440
7	100	100	100	100	130	160	190	230	260	300	330	370	410	440	480
8	100	100	100	110	140	180	210	250	280	320	360	400	440	480	510
9	100	100	100	120	150	190	230	270	300	340	380	420	470	510	550
10	100	100	100	120	160	200	240	280	320	370	410	450	500	540	580
11	100	100	100	130	170	210	260	300	340	390	430	480	520	570	620
12	100	100	110	140	180	220	270	310	360	410	450	500	550	600	650
13	100	100	110	150	190	230	280	330	380	430	480	530	580	630	680
14	100	100	110	160	200	240	290	340	390	440	500	550	600	660	710
15	100	100	120	160	210	250	300	350	410	460	520	570	630	680	740
16	100	100	120	170	210	260	310	370	420	480	540	590	650	710	770
17	100	100	130	180	220	270	330	380	440	500	550	610	670	730	790
18	100	100	130	180	230	280	340	390	450	510	570	630	700	760	820
19	100	100	140	190	240	290	350	410	470	530	590	650	720	780	840
20	100	100	140	190	240	300	360	420	480	540	610	670	740	800	870
21	100	100	150	200	250	310	370	430	490	560	620	690	760	820	890
22	100	100	150	200	260	320	380	440	510	570	640	710	780	850	920
23	100	110	160	210	270	330	390	450	520	590	660	730	800	870	940
24	100	110	160	210	270	330	400	470	530	600	670	750	820	890	960
25	100	110	170	220	280	340	410	480	550	620	690	760	840	910	980
26	100	120	170	220	290	350	420	490	560	630	710	780	860	930	1000
27	100	120	170	230	290	360	430	500	570	650	720	800	870	950	1000
28	100	120	180	240	300	370	440	510	580	660	740	810	890	970	1100
29	100	130	180	240	310	370	450	520	600	670	750	830	910	990	1100
30	100	130	180	250	310	380	450	530	610	690	770	850	930	1000	1100
31	100	130	190	250	320	390	460	540	620	700	780	860	950	1000	1100
32	100	140	190	260	320	400	470	550	630	710	800	880	960	1000	1100
33	100	140	200	260	330	400	480	560	640	730	810	900	980	1100	1200
34	100	140	200	270	340	410	490	570	650	740	820	910	1000	1100	1200
35	100	140	200	270	340	420	500	580	660	750	840	930	1000	1100	1200
36	100	150	210	270	350	420	510	590	680	760	850	940	1000	1100	1200
37	100	150	210	280	350	430	510	600	690	770	870	960	1000	1100	1200
38	100	150	210	280	360	440	520	610	700	790	880	970	1100	1200	1300
39	100	150	220	290	360	440	530	620	710	800	890	990	1100	1200	1300
40	100	150	220	290	370	450	540	630	720	810	900	1000	1100	1200	1300

TABLE 2. OUTER BUFFER ZONE DISTANCES (FEET) FOR FIELD SOIL FUMIGATION, EXCEPT METHOD SECTION 6450.3(a)(3)(B)1. (CONTINUED)

- Select the appropriate number of "Acres" in the left-hand column.
- Select the appropriate "Emission Rate" from the top row.
- Read the buffer zone distance where the "Acres" row and the "Emission Rate" columns intersect.

Acres	Emission Rate (pounds/acre-day)														
	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
1	170	180	190	200	210	220	240	250	260	270	280	290	300	310	320
2	240	260	280	290	310	330	350	360	380	390	410	430	440	460	470
3	320	340	360	380	410	430	450	470	490	510	530	550	570	590	610
4	380	410	430	460	490	510	540	560	590	610	640	660	690	710	730
5	430	460	490	520	550	580	610	640	670	700	720	750	780	810	830
6	480	510	540	580	610	640	670	700	740	770	800	830	860	890	920
7	520	550	590	620	660	690	730	760	800	830	860	900	930	960	990
8	550	590	630	670	710	750	780	820	860	890	930	960	1000	1000	1100
9	590	630	670	710	760	800	840	870	910	950	990	1000	1100	1100	1100
10	630	670	720	760	800	840	890	930	970	1000	1000	1100	1100	1200	1200
11	660	710	760	800	850	890	940	980	1000	1100	1100	1200	1200	1200	1300
12	700	750	800	840	890	940	990	1000	1100	1100	1200	1200	1300	1300	1300
13	730	780	830	880	930	980	1000	1100	1100	1200	1200	1300	1300	1400	1400
14	760	820	870	920	970	1000	1100	1100	1200	1200	1300	1300	1400	1400	1500
15	790	850	900	960	1000	1100	1100	1200	1200	1300	1300	1400	1400	1500	1500
16	820	880	940	990	1000	1100	1200	1200	1300	1300	1400	1400	1500	1500	1600
17	850	910	970	1000	1100	1100	1200	1300	1300	1400	1400	1500	1500	1600	1600
18	880	940	1000	1100	1100	1200	1200	1300	1400	1400	1500	1500	1600	1600	1700
19	910	970	1000	1100	1200	1200	1300	1300	1400	1400	1500	1600	1600	1700	1700
20	930	1000	1100	1100	1200	1200	1300	1400	1400	1500	1500	1600	1700	1700	1800
21	960	1000	1100	1200	1200	1300	1300	1400	1500	1500	1600	1700	1700	1800	1800
22	980	1100	1100	1200	1300	1300	1400	1400	1500	1600	1600	1700	1800	1800	1900
23	1000	1100	1100	1200	1300	1400	1400	1500	1500	1600	1700	1700	1800	1900	1900
24	1000	1100	1200	1200	1300	1400	1500	1500	1600	1700	1700	1800	1800	1900	2000
25	1100	1100	1200	1300	1300	1400	1500	1600	1600	1700	1800	1800	1900	1900	2000
26	1100	1200	1200	1300	1400	1400	1500	1600	1700	1700	1800	1900	1900	2000	2100
27	1100	1200	1300	1300	1400	1500	1600	1600	1700	1800	1800	1900	2000	2000	2100
28	1100	1200	1300	1400	1400	1500	1600	1700	1700	1800	1900	1900	2000	2100	2100
29	1200	1200	1300	1400	1500	1500	1600	1700	1800	1800	1900	2000	2100	2100	2200
30	1200	1300	1300	1400	1500	1600	1600	1700	1800	1900	1900	2000	2100	2200	2200
31	1200	1300	1400	1400	1500	1600	1700	1800	1800	1900	2000	2100	2100	2200	2300
32	1200	1300	1400	1500	1500	1600	1700	1800	1900	1900	2000	2100	2200	2200	2300
33	1200	1300	1400	1500	1600	1700	1700	1800	1900	2000	2100	2100	2200	2300	2400
34	1300	1300	1400	1500	1600	1700	1800	1900	1900	2000	2100	2200	2200	2300	2400
35	1300	1400	1500	1500	1600	1700	1800	1900	2000	2000	2100	2200	2300	2400	2400
36	1300	1400	1500	1600	1700	1700	1800	1900	2000	2100	2200	2200	2300	2400	2500
37	1300	1400	1500	1600	1700	1800	1900	1900	2000	2100	2200	2300	2400	2400	2500
38	1300	1400	1500	1600	1700	1800	1900	2000	2100	2100	2200	2300	2400	2500	2500
39	1400	1500	1500	1600	1700	1800	1900	2000	2100	2200	2300	2300	2400	2500	2600
40	1400	1500	1600	1700	1800	1800	1900	2000	2100	2200	2300	2400	2500	2500	2600

TABLE 2. OUTER BUFFER ZONE DISTANCES (FEET) FOR FIELD SOIL FUMIGATION, EXCEPT METHOD SECTION 6450.3(a)(3)(B)1. (CONTINUED)

- Select the appropriate number of "Acres" in the left-hand column.
- Select the appropriate "Emission Rate" from the top row.
- Read the buffer zone distance where the "Acres" row and the "Emission Rate" columns intersect.

Acres	Emission Rate (pounds/acre-day)													
	180	185	190	195	200	205	210	215	220	225	230	235	240	250
1	330	350	360	370	380	390	400	400	410	420	430	440	450	460
2	490	500	520	530	550	560	570	590	600	620	630	640	660	670
3	630	650	670	690	710	730	750	760	780	800	820	830	850	870
4	760	780	800	830	850	870	890	910	930	950	980	1000	1000	1000
5	860	890	910	940	960	990	1000	1000	1100	1100	1100	1100	1200	1200
6	950	970	1000	1000	1100	1100	1100	1100	1200	1200	1200	1200	1300	1300
7	1000	1100	1100	1100	1100	1200	1200	1200	1300	1300	1300	1300	1400	1400
8	1100	1100	1200	1200	1200	1300	1300	1300	1400	1400	1400	1400	1500	1500
9	1200	1200	1200	1300	1300	1300	1400	1400	1400	1500	1500	1500	1600	1600
10	1200	1300	1300	1400	1400	1400	1500	1500	1500	1600	1600	1600	1700	1700
11	1300	1400	1400	1400	1500	1500	1500	1600	1600	1600	1700	1700	1800	1800
12	1400	1400	1500	1500	1500	1600	1600	1700	1700	1700	1800	1800	1800	1900
13	1400	1500	1500	1600	1600	1700	1700	1700	1800	1800	1900	1900	1900	2000
14	1500	1600	1600	1600	1700	1700	1800	1800	1800	1900	1900	2000	2000	2000
15	1600	1600	1700	1700	1700	1800	1800	1900	1900	2000	2000	2000	2100	2100
16	1600	1700	1700	1800	1800	1900	1900	1900	2000	2000	2100	2100	2200	2200
17	1700	1700	1800	1800	1900	1900	2000	2000	2100	2100	2100	2200	2200	2300
18	1700	1800	1800	1900	1900	2000	2000	2100	2100	2200	2200	2300	2300	2300
19	1800	1800	1900	1900	2000	2000	2100	2100	2200	2200	2300	2300	2400	2400
20	1800	1900	1900	2000	2000	2100	2100	2200	2200	2300	2300	2400	2400	2500
21	1900	1900	2000	2000	2100	2200	2200	2300	2300	2400	2400	2500	2500	2600
22	1900	2000	2000	2100	2200	2200	2300	2300	2400	2400	2500	2500	2600	2600
23	2000	2000	2100	2200	2200	2300	2300	2400	2400	2500	2500	2600	2600	2700
24	2000	2100	2100	2200	2300	2300	2400	2400	2500	2500	2600	2600	2700	2700
25	2100	2100	2200	2300	2300	2400	2400	2500	2500	2600	2700	2700	2800	2800
26	2100	2200	2200	2300	2400	2400	2500	2500	2600	2700	2700	2800	2800	2900
27	2200	2200	2300	2400	2400	2500	2500	2600	2700	2700	2800	2800	2900	2900
28	2200	2300	2300	2400	2500	2500	2600	2600	2700	2800	2800	2900	2900	3000
29	2300	2300	2400	2500	2500	2600	2600	2700	2800	2800	2900	2900	3000	3100
30	2300	2400	2400	2500	2600	2600	2700	2800	2800	2900	2900	3000	3100	3100
31	2300	2400	2500	2500	2600	2700	2700	2800	2900	2900	3000	3100	3100	3200
32	2400	2500	2500	2600	2700	2700	2800	2900	2900	3000	3000	3100	3200	3200
33	2400	2500	2600	2600	2700	2800	2800	2900	3000	3000	3100	3200	3200	3300
34	2500	2500	2600	2700	2800	2800	2900	3000	3000	3100	3200	3200	3300	3300
35	2500	2600	2700	2700	2800	2900	2900	3000	3100	3100	3200	3300	3300	3400
36	2500	2600	2700	2800	2800	2900	3000	3100	3100	3200	3300	3300	3400	3400
37	2600	2700	2700	2800	2900	3000	3000	3100	3200	3200	3300	3400	3400	3500
38	2600	2700	2800	2900	2900	3000	3100	3100	3200	3300	3400	3400	3500	3600
39	2700	2700	2800	2900	3000	3000	3100	3200	3300	3300	3400	3500	3500	3600
40	2700	2800	2900	2900	3000	3100	3200	3200	3300	3400	3400	3500	3600	3700

TABLE 2. OUTER BUFFER ZONE DISTANCES (FEET) FOR FIELD SOIL FUMIGATION, EXCEPT METHOD SECTION 6450.3(a)(3)(B)1. (CONTINUED)

- Select the appropriate number of "Acres" in the left-hand column.
- Select the appropriate "Emission Rate" from the top row.
- Read the buffer zone distance where the "Acres" row and the "Emission Rate" columns intersect.

Acres	Emission Rate (pounds/acre-day)													
	255	260	265	270	275	280	285	290	295	300	305	310	315	320
1	480	490	500	500	510	520	530	540	550	550	560	570	580	580
2	690	710	720	730	740	760	770	780	790	800	810	820	840	850
3	900	920	930	950	960	980	990	1000	1000	1000	1100	1100	1100	1100
4	1100	1100	1100	1100	1200	1200	1200	1200	1200	1200	1300	1300	1300	1300
5	1200	1200	1300	1300	1300	1300	1300	1400	1400	1400	1400	1400	1500	1500
6	1300	1400	1400	1400	1400	1500	1500	1500	1500	1500	1600	1600	1600	1600
7	1400	1500	1500	1500	1500	1600	1600	1600	1600	1700	1700	1700	1700	1800
8	1600	1600	1600	1600	1700	1700	1700	1700	1800	1800	1800	1800	1900	1900
9	1700	1700	1700	1700	1800	1800	1800	1900	1900	1900	1900	2000	2000	2000
10	1800	1800	1800	1800	1900	1900	1900	2000	2000	2000	2100	2100	2100	2100
11	1900	1900	1900	1900	2000	2000	2000	2100	2100	2100	2200	2200	2200	2300
12	1900	2000	2000	2000	2100	2100	2100	2200	2200	2200	2300	2300	2300	2400
13	2000	2100	2100	2100	2200	2200	2200	2300	2300	2300	2400	2400	2400	2500
14	2100	2200	2200	2200	2300	2300	2300	2400	2400	2400	2500	2500	2500	2600
15	2200	2200	2300	2300	2400	2400	2400	2500	2500	2500	2600	2600	2600	2700
16	2300	2300	2400	2400	2400	2500	2500	2600	2600	2600	2700	2700	2700	2800
17	2400	2400	2400	2500	2500	2600	2600	2600	2700	2700	2800	2800	2800	2900
18	2400	2500	2500	2600	2600	2600	2700	2700	2800	2800	2800	2900	2900	3000
19	2500	2500	2600	2600	2700	2700	2800	2800	2800	2900	2900	3000	3000	3000
20	2600	2600	2700	2700	2800	2800	2800	2900	2900	3000	3000	3000	3100	3100
21	2600	2700	2700	2800	2800	2900	2900	3000	3000	3000	3100	3100	3200	3200
22	2700	2800	2800	2900	2900	2900	3000	3000	3100	3100	3200	3200	3300	3300
23	2800	2800	2900	2900	3000	3000	3100	3100	3200	3200	3200	3300	3300	3400
24	2800	2900	2900	3000	3000	3100	3100	3200	3200	3300	3300	3400	3400	3500
25	2900	3000	3000	3100	3100	3200	3200	3300	3300	3400	3400	3400	3500	3500
26	3000	3000	3100	3100	3200	3200	3300	3300	3400	3400	3500	3500	3600	3600
27	3000	3100	3100	3200	3300	3300	3400	3400	3500	3500	3600	3600	3600	3700
28	3100	3200	3200	3300	3300	3400	3400	3500	3500	3600	3600	3700	3700	3800
29	3200	3200	3300	3300	3400	3400	3500	3500	3600	3600	3700	3700	3800	3800
30	3200	3300	3300	3400	3500	3500	3600	3600	3700	3700	3800	3800	3900	3900
31	3300	3300	3400	3500	3500	3600	3600	3700	3700	3800	3800	3900	3900	4000
32	3300	3400	3500	3500	3600	3600	3700	3700	3800	3900	3900	4000	4000	4100
33	3400	3500	3500	3600	3600	3700	3800	3800	3900	3900	4000	4000	4100	4100
34	3500	3500	3600	3600	3700	3800	3800	3900	3900	4000	4000	4100	4100	4200
35	3500	3600	3600	3700	3800	3800	3900	3900	4000	4100	4100	4200	4200	4300
36	3600	3600	3700	3800	3800	3900	3900	4000	4100	4100	4200	4200	4300	4300
37	3600	3700	3800	3800	3900	3900	4000	4100	4100	4200	4200	4300	4300	4400
38	3700	3700	3800	3900	3900	4000	4100	4100	4200	4200	4300	4400	4400	4500
39	3700	3800	3900	3900	4000	4100	4100	4200	4200	4300	4400	4400	4500	4500
40	3800	3900	3900	4000	4100	4100	4200	4200	4300	4400	4400	4500	4500	4600

**TABLE 3: OUTER BUFFER ZONE DISTANCES FOR FUMIGATION METHOD
SECTION 6450.3(a)(3)(B)1. TARPAULIN/SHALLOW/BROADCAST
("NOBEL PLOW") FIELD SOIL FUMIGATION WHERE APPLICATION BLOCKS
ARE:**

1. 10 ACRES OR LESS

2. APPLICATION RATES OF 235 POUNDS PER ACRE OR LESS

Acres	Coastal Counties	Inland Counties
1	60	60
2	60	60
3	60	60
4	60	60
5	60	60
6	60	*
7	70	*
8	80	*
9	90	*
10	100	*

* Use Table 2 to determine buffer zones for acreage larger than listed on this table.

Fumigations using rates greater than 235 pounds per acre are determined using Table 2.

TABLE 4. INNER BUFFER ZONE DISTANCES (FEET) FOR FIELD SOIL FUMIGATION

- Select the appropriate "Acreage" in the left-hand column.
- Select the appropriate "Emission Rate" from the top row.
- Read the buffer zone distance where the "Acreage" row and the "Emission Rate" columns intersect.

Acres	Emission Rate (pounds/acre-day)														
	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
1	50	50	50	50	50	50	60	70	80	90	100	120	130	140	150
2	50	50	50	50	60	70	90	100	120	140	150	170	190	210	230
3	50	50	50	60	80	100	120	140	160	180	200	220	250	270	290
4	50	50	60	70	100	120	140	170	190	220	240	270	300	320	350
5	50	50	60	90	110	130	160	190	220	250	280	310	340	370	400
6	50	50	70	100	120	150	180	210	240	270	310	340	370	410	440
7	50	50	80	100	130	160	200	230	260	300	330	370	400	440	480
8	50	60	80	110	140	180	210	250	280	320	360	400	430	470	510
9	50	60	90	120	150	190	230	260	300	340	380	420	460	510	550
10	50	70	100	130	160	200	240	280	320	360	410	450	490	540	580
11	50	70	100	140	170	210	250	300	340	380	430	480	520	570	620
12	50	70	110	140	180	220	270	310	360	400	450	500	550	600	650
13	50	80	110	150	190	230	280	330	370	420	470	520	580	630	680
14	50	80	120	160	200	240	290	340	390	440	490	550	600	650	710
15	50	80	120	160	210	250	300	350	410	460	510	570	630	680	740
16	50	90	130	170	210	260	310	370	420	480	530	590	650	710	760
17	60	90	130	170	220	270	320	380	440	490	550	610	670	730	790
18	60	90	130	180	230	280	340	390	450	510	570	630	690	750	820
19	60	100	140	190	240	290	350	400	460	530	590	650	710	780	840
20	60	100	140	190	240	300	360	420	480	540	600	670	740	800	870
21	60	100	150	200	250	310	370	430	490	560	620	690	760	820	890
22	70	110	150	200	260	310	380	440	500	570	640	710	780	850	910
23	70	110	160	210	260	320	390	450	520	590	650	730	800	870	940
24	70	110	160	210	270	330	390	460	530	600	670	740	820	890	960
25	70	110	160	220	280	340	400	470	540	610	690	760	840	910	990
26	70	120	170	220	280	350	410	480	550	630	700	780	850	930	1000
27	80	120	170	230	290	350	420	490	570	640	720	800	870	950	1000
28	80	120	170	230	300	360	430	500	580	660	730	810	890	970	1100
29	80	130	180	240	300	370	440	520	590	670	750	830	910	990	1100
30	80	130	180	240	310	380	450	530	600	680	760	850	930	1000	1100
31	80	130	190	250	310	390	460	540	620	700	780	860	950	1000	1100
32	80	130	190	250	320	390	470	550	630	710	790	880	960	1000	1100
33	90	140	190	260	330	400	480	560	640	720	810	890	980	1100	1200
34	90	140	200	260	330	410	490	570	650	740	820	910	1000	1100	1200
35	90	140	200	270	340	420	500	580	660	750	840	930	1000	1100	1200
36	90	140	210	270	350	420	500	590	680	760	850	940	1000	1100	1200
37	90	150	210	280	350	430	510	600	690	780	870	960	1000	1100	1200
38	90	150	210	280	360	440	520	610	700	790	880	970	1100	1200	1200
39	90	150	220	290	360	440	530	620	710	800	890	980	1100	1200	1300
40	100	150	220	290	370	450	540	630	720	810	900	1000	1100	1200	1300

TABLE 4. INNER BUFFER ZONE DISTANCES (FEET) FOR FIELD SOIL FUMIGATION. (CONTINUED)

- Select the appropriate "Acreage" in the left-hand column.
- Select the appropriate "Emission Rate" from the top row.
- Read the buffer zone distance where the "Acreage" row and the "Emission Rate" columns intersect.

Acres	Emission Rate (pounds/acre-day)											
	210	220	230	240	250	260	270	280	290	300	310	320
1	170	180	190	200	210	220	240	250	260	270	280	290
2	240	260	280	290	310	330	350	360	380	390	410	430
3	320	340	360	380	410	430	450	470	490	510	530	550
4	380	410	430	460	490	510	540	560	590	610	640	660
5	430	460	490	520	550	580	610	640	670	700	720	750
6	480	510	540	580	610	640	670	700	740	770	800	830
7	520	550	590	620	660	690	730	760	800	830	860	900
8	550	590	630	670	710	750	780	820	860	890	930	960
9	590	630	670	710	760	800	840	870	910	950	990	1000
10	630	670	720	760	800	840	890	930	970	1000	1000	1100
11	660	710	760	800	850	890	940	980	1000	1100	1100	1200
12	700	750	800	840	890	940	990	1000	1100	1100	1200	1200
13	730	780	830	880	930	980	1000	1100	1100	1200	1200	1300
14	760	820	870	920	970	1000	1100	1100	1200	1200	1300	1300
15	790	850	900	960	1000	1100	1100	1200	1200	1300	1300	1400
16	820	880	940	990	1000	1100	1200	1200	1300	1300	1400	1400
17	850	910	970	1000	1100	1100	1200	1300	1300	1400	1400	1500
18	880	940	1000	1100	1100	1200	1200	1300	1400	1400	1500	1500
19	910	970	1000	1100	1200	1200	1300	1300	1400	1400	1500	1600
20	930	1000	1100	1100	1200	1200	1300	1400	1400	1500	1500	1600
21	960	1000	1100	1200	1200	1300	1300	1400	1500	1500	1600	1700
22	980	1100	1100	1200	1300	1300	1400	1400	1500	1600	1600	1700
23	1000	1100	1100	1200	1300	1400	1400	1500	1500	1600	1700	1700
24	1000	1100	1200	1200	1300	1400	1500	1500	1600	1700	1700	1800
25	1100	1100	1200	1300	1300	1400	1500	1600	1600	1700	1800	1800
26	1100	1200	1200	1300	1400	1400	1500	1600	1700	1700	1800	1900
27	1100	1200	1300	1300	1400	1500	1600	1600	1700	1800	1800	1900
28	1100	1200	1300	1400	1400	1500	1600	1700	1700	1800	1900	1900
29	1200	1200	1300	1400	1500	1500	1600	1700	1800	1800	1900	2000
30	1200	1300	1300	1400	1500	1600	1600	1700	1800	1900	1900	2000
31	1200	1300	1400	1400	1500	1600	1700	1800	1800	1900	2000	2100
32	1200	1300	1400	1500	1500	1600	1700	1800	1900	1900	2000	2100
33	1200	1300	1400	1500	1600	1700	1700	1800	1900	2000	2100	2100
34	1300	1300	1400	1500	1600	1700	1800	1900	1900	2000	2100	2200
35	1300	1400	1500	1500	1600	1700	1800	1900	2000	2000	2100	2200
36	1300	1400	1500	1600	1700	1700	1800	1900	2000	2100	2200	2200
37	1300	1400	1500	1600	1700	1800	1900	1900	2000	2100	2200	2300
38	1300	1400	1500	1600	1700	1800	1900	2000	2100	2100	2200	2300
39	1400	1500	1500	1600	1700	1800	1900	2000	2100	2200	2300	2300
40	1400	1500	1600	1700	1800	1800	1900	2000	2100	2200	2300	2400

TABLE 5: BUFFER ZONE DURATION (HOURS) FOR FIELD SOIL FUMIGATION

TABLE 5A:
Nontarpaulin/Shallow/Bed - Section 6450.3(a)(1)

	Application Rate (pounds per acre)										
Acres	150	175	200	225	250	275	300	325	350	375	400
1 - 10	36	36	36	*	*	*	*	*	*	*	*
11 - 20	36	36	36	*	*	*	*	*	*	*	*
21 - 30	36	36	36	*	*	*	*	*	*	*	*
31 - 40	36	36	36	*	*	*	*	*	*	*	*

* Application rates not allowed

TABLE 5B:
Nontarpaulin/Deep/Broadcast - Section 6450.3(a)(2)
Tarp/Deep/Broadcast - Section 6450.3(a)(5)

	Application Rate (pounds per acre)										
Acres	150	175	200	225	250	275	300	325	350	375	400
1 - 10	36	36	36	36	36	36	60	60	60	60	60
11 - 20	36	36	36	36	36	60	60	60	60	60	60
21 - 30	36	36	36	60	60	60	60	60	60	60	84
31 - 40	36	36	36	60	60	60	60	60	60	60	84

TABLE 5C:
Tarpaulin/Shallow/Broadcast - Section 6450.3(a)(3)
Tarpaulin/Shallow/Bed - Section 6450.3(a)(4)
Drip System/HotGas - Section 6450.3(a)(6)

	Application Rate (pounds per acre)										
Acres	150	175	200	225	250	275	300	325	350	375	400
1 - 10	36	36	36	36	36	36	36	36	36	36	36
11 - 20	36	36	36	36	36	36	36	36	36	60	60
21 - 30	36	36	36	36	36	36	36	60	60	60	60
31 - 40	36	36	36	36	36	36	36	60	60	60	60

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ENGINEERING CONTROLS

This section describes the equipment modifications and control measures designed to improve worker safety that are to be used for the Fumigation Methods described in section 6450.3 and listed in *Table 1*. Also, this section includes diagrams of approved fumigation equipment configurations.

Fumigant Line Requirements

1. General requirements are covered in regulation section 6450(g). This section requires fumigation equipment to eliminate drip by clearing the fumigant from the injection device (chisel, Nobel Plow) before it is lifted or removed from the soil.
2. There are specific requirements for fumigation lines for the Drip System - Hot Gas fumigation method. These requirements are covered by section 6450.3(a)(6).

Air-Fan Dilution Equipment Description/Diagrams (*Figures 8 and 9*)

1. The fumigation tractor must incorporate a working-area air-fan dilution system consisting of a ducted fan/blower. The air fan dilution system is installed directly above the tractor driver's head (*Figure 8*) to provide a continuous downward flow of air over the driver's body when the equipment is in use. The air-fan dilution requirement only applies to the tractor used to apply the fumigant.
2. The fan/blower must be mounted so that the fan/blower intake is at least 126 inches from the ground.
3. A protective screen must be mounted at the exhaust end of the fan/blower to protect the driver from the fan blades (*Figure 9*).
4. A diverter device consisting of tubing with a 4-inch inside diameter must be attached to the underside of the protective screen under the fan to direct the air flow to the breathing zone of the copilot (*Figure 8*). The diverter device must be made of material such as flexible tubing, PVC pipe, sheet metal, or similar durable material.

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5. The inside diameter of the air intake must be 21 inches, surrounded by a flat metal ring measuring 11 inches out from the edge of the intake.
6. The total diameter of the air fan dilution system must be 43 inches.
7. The fan/blower must be capable of operating at a minimum of 1,600 revolutions per minute and producing a minimum flow rate of 3,000 cubic feet of air per minute.
8. The application tractor must be equipped with a flexible tube to direct the engine exhaust fumes away from the air intake of the fan described above, to an area behind the tractor and away from any person(s) involved in the application.

Exception: An air-fan dilution system is not required if the fumigation conforms to the requirements for the following fumigation methods:

- | | |
|------------------------------------|---------------------------------|
| a) Non-Tarpaulin/Shallow/Broadcast | [Section 6450.3(a)(2)(B)2.] |
| b) Tarpaulin/Shallow/Broadcast | [Section 6450.3(a)(3)(B)2.] |
| c) Tarpaulin/Shallow/Bed | [Section 6450.3(a)(4)(B)1,2,3.] |
| d) Tarpaulin/Deep/Broadcast | [Section 6450.3(a)(5)(B)2.] |

Chisel Descriptions / Photos

1. Forward-Curved Chisels (*Figure 11*)
2. Rearward-Curved/Swept Back Chisels (*Figure 12*)

Nobel Plow/Modified Nobel Plow Descriptions / Photo (*Figure 10*)

1. The Nobel Plow is an example of plow consisting of horizontal v-shaped blades mounted by a vertical arm to the tool bar which inject methyl bromide in combination with chloropicrin laterally to a depth of between 10-15 inches, beneath the soil surface. The Nobel Plow has two 32-inch wide plows on spacing that does not exceed 48 inches. The **Modified Nobel Plow** has four 12-inch wide plows on 24-inch spacing.

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2. The injection outlets must be evenly spaced across the trailing edge of each blade at 12-inch intervals.
3. In addition, two conventional vertical shanks on each end of the tool bar are to be used in association with shovels used to open and close the soil over the leading edge of the tarpaulin.

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WORKER SAFETY REQUIREMENTS

Fumigation Handling Activities

This section describes the worker safety requirements for employees involved in methyl bromide field soil fumigation "handling" activities. These worker safety requirements are covered in section 6784. This regulation specifies that **"fumigation handling activities"** include employees who are assigned to perform the following:

- 1) **"Shovelers"** - An employee involved in assisting with covering the tarpaulin with soil at the end of the rows (Note: Shovelers can work ONLY at the ends of the application rows);
- 2) An employee observing the overall operation;
- 3) An employee checking tarpaulin placement;
- 4) **"Copilots"** - Changing cylinders;
- 5) **"Drivers"** - Operating fumigation equipment; and
- 6) **"Tarpaulin Cutters and Tarpaulin Removers"**

Employer Recordkeeping

Regulation section 6784(b)(2) requires employers to maintain records for all employees involved in methyl bromide field soil fumigation handling activities. These records must be maintained at a central location for two years and be made available to the commissioner on request. The information must include:

- 1) Identity of the person involved in fumigation handling;
- 2) Work activity (Shoveler, Copilot, Driver, Tarpaulin Cutter or Remover)
- 3) Date(s) worked in any of these activities;
- 4) Duration worked in any of these activities (See below for "Multiple Task Employees");
- 5) U.S. EPA Registration Number for specific methyl bromide product(s) handled; and ,
- 6) Brand name of specific methyl bromide product(s) handled.

DPR does not prescribe a particular format for documenting this information.

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Limited Work Hours

The regulations prohibit an employee from working in fumigation handling activities more than the hours specified in the chart below, in a 24-hour period, during the injection period and during the REI.

Multiple Task Employees

An employee can work in more than one work task and/or fumigation method in a 24-hour period, as long as the employee's total work hours do not exceed the lowest total hours specified in the chart below for any one work task or fumigation method performed.

Table 6. Fumigation Handling Activities

Fumigation Method	Maximum Application Rate	Activities/Maximum Work Hours in a 24-Hour Period				
		Application Equipment Driving	Applicator	Shoveling, Copiloting	Tarpaulin Cutting	Tarpaulin Removal
Nontarpaulin/Shallow/Bed	200 lbs.	4*	--	--	--	--
Nontarpaulin/Deep/Broadcast	400 lbs.	4*	--	--	--	--
Tarpaulin/Shallow/ Broadcast	400 lbs.	4*	--	3*	4	7
Tarpaulin/Shallow/Bed	250 lbs.	4*	--	4*	4	7
Tarpaulin/Deep/ Broadcast	400 lbs.	4*	--	3*	4	7
Drip System – Hot Gas	225 lbs.	--	2*	--	4	7

*If the actual methyl bromide application rate is less than the maximum application rate shown in the chart above for the particular fumigation method used, the maximum work hours may be increased in accordance with the following formula:

$$\left(\frac{\text{maximum application rate for method}}{\text{actual application rate}} \right) \times \text{maximum work hours in a 24-hour period} = \text{revised work hours in a 24-hour period}$$

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Tarpaulin Repair Response and Tarpaulin Removal Plans

The operator of the property to be treated must include in the Work Site Plan specific information about the tarpaulin repair and tarpaulin removal procedures that are to be followed at the fumigation site.

The **Tarpaulin Repair Response Plan** must identify the responsibilities of the licensed pest control business and/or the permittee with regard to tarpaulin damage and repair activities.

The following information should be included in the tarpaulin repair response plan:

- Person(s) responsible for the repair
- Person(s) certified to test ambient air concentrations of methyl bromide
- Schedule for checking tarpaulins
- Minimum distance(s) from sensitive sites that tarpaulins will be repaired
- Minimum time following injection that tarpaulin will be repaired
- Minimum size of damage that will be repaired
- Other factors used to determine when tarpaulin repair will be conducted such as, hazard to the public, residents or workers; proximity to occupied structures; feasibility of repair; and environmental factors such as wind speed and direction.

Tarpaulin Cutting and Removal Procedures

Regulation section 6784(b)(5) requires tarpaulin cutting and tarpaulin removal be discontinued if the presence of gas is readily evident (onset of eye irritation or odor). Also tarpaulins used for broadcast fumigation, must be cut using only mechanical methods (all-terrain vehicle or a tractor with a cutting wheel), and that each panel be cut lengthwise. Employees must not be allowed to use hand-tools such as, shovels or knives to cut the tarpaulins. **Tarp cutting and removal requirements cannot be waived even if tarps remain in place for several weeks or longer.**

"Cutting" Transit Areas (Roads) Prior to Tarpaulin Removal

Tarpaulin covered fields that have been fumigated must not be disturbed by cutting roads through them prior to tarpaulin removal. This practice cannot be construed as "aeration" and is not consistent with section 6450.3. This section contains the only currently accepted (legal) fumigation methods and procedures for field soil fumigation in California.

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Strip Fumigations

Strip fumigations are applications that have alternating fumigated and unfumigated areas, similar to bed fumigations where the beds are fumigated and the furrows are not fumigated. Strip fumigations can be used for broadcast (flat field) fumigations [methods 6450.3(a)(2), (3), and (5)]. Notwithstanding 3CCR Section 6770, commissioners should not allow entry into the treated area prior to the expiration of the REI, including the strips not fumigated, except to repair tarps as described in 3CCR Section 6784(b)(6). For tarp/broadcast fumigations [methods 6450.3(a)(3) and (5)], the REI does not expire until the tarps are removed. This precludes fumigating the area between tarped strips until the tarps have been removed.